

THE NORTH AMERICAN SPECIES OF *CALLICERA* PANZER  
(DIPTERA: SYRPHIDAE)

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*Abstract.*—The North American species of *Callicera* are revised. Two new synonyms are proposed, *johnsoni* Hunter and *auripila* Metcalf = *erratica* Walker. Lectotypes are designated for *auripila* Metcalf, *erratica* Walker, and *montensis* Snow. A key to the North American species is presented.

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The genus *Callicera* Panzer is a small group of rarely collected, and probably rare north-temperate flower flies. Eighteen species are known: 8 Palearctic; 6 Oriental; 3 Nearctic; and 1 Neotropical (Coe, 1964; Knutson et al., 1975; Thompson and Pedersen<sup>1</sup>). At the start of my study I requested material from some 40 collections. This yielded 53 previously identified specimens of North American *Callicera* and approximately 30,000 unidentified flower flies in which I found an additional 6 specimens. The reason for the apparent scarcity of *Callicera* is unknown.

The immature stages of the Palearctic species, *rufa* Schummel, are known. These immatures, found in a waterfilled rot-hole about two feet deep in an ancient scotch pine (*Pinus sylvestris* L.), represent a curious intermediate larval type between the long-tailed (rat-tailed) eristaline maggots usually found in this kind of habitat and the short-tailed, wood-boring milesiine maggots (Coe, 1938, 1939, 1941).

The North American species of *Callicera* have never been revised, there having been only a succession of new species descriptions. The only key to species (Curran, 1935) included four species. This revision presents a new key, two new synonyms, three lectotype designations, redescriptions, complete synonymies, and new distributional and biological data for all North American species.

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<sup>1</sup> Thompson, F. C. and E. Torp Pedersen. Flower flies (Diptera: Syrphidae) of the Palearctic Region—a Guide and Catalog. Entomonograph, Copenhagen. (In preparation.)

Genus *Callicera* Panzer

*Callicera* Panzer, 1809: 17. Type-species, *Bibio aenea* Fabricius (by monotypy). New World references only: Snow, 1892: 33 (review, 1 sp.); Aldrich, 1905: 347 (cat. cit., 2 spp.); Verrall, 1913: 323–333 (partial review, 2 spp.); Curran, 1935: 5 (key, 4 New World spp.); Hull, 1949: 341 (descript., 4 spp.); Fluke, 1957: 57 (cat. cit., 1 Neotropical sp.); Wirth et al., 1965: 595 (cat. cit., 4 Nearctic spp.); Cole, 1969: 307 (biol. note, 2 western N. Amer. spp.); Thompson et al., 1976: 88 (cat. cit., 1 Neotropical sp.). *Gallicera*, Imperial Bureau of Entomology, 1928: 337 (misspelling of *Callicera*); Hull, 1949: 403 (cited as "*Genera incertis sedae*" and attributed to Portevin, 1927).

Description.—*Head*: About  $\frac{1}{3}$  higher than long; face broad, occupying about  $\frac{1}{2}$  head width, densely pilose, shiny, with a small tubercle; epistoma indistinctly produced; cheek broad, about as long as broad, pilose; facial groove elongate, extending only to level of tubercle; facial stripe narrow, pollinose, pilose; frontal prominence distinct, frequently bulbous, at dorsal  $\frac{1}{5}$  of head; frontal triangle bulbous, bare; vertical triangle small, equilateral, less than  $\frac{1}{2}$  as long as eye contiguity; front broad, about  $\frac{1}{3}$  head width, about  $\frac{2}{3}$  as long as face, pilose; head holoptic in males; eye pilose; antenna with terminal arista.

*Thorax*: With long pile, without bristles; humerus, propleuron, sternopleuron entirely, and metasternum pilose; anterior mesopleuron, posterior pteropleuron, and barrette bare; hypopleuron usually with pile in front of metathoracic spiracle; scutellum simple, with abundant ventral pile fringe; plumula elongate; legs simple, without basoventral spinose pile patches, with middle and hind coxae bare posteriorly; postmetacoxal bridge incomplete. *Wing*: Marginal cell open; apical cell closed with short petiole; anterior crossvein basal, straight, at basal  $\frac{1}{4}$  to  $\frac{1}{3}$  of discal cell; 3rd vein straight.

*Abdomen*: Short, oval, without premarginal sulcus; 1st spiracle embedded.

*Male genitalia*: Cercus simple; surstyle with a long curved dorsoapical lobe and usually with two ventral lobes, rarely with ventral area undifferentiated; 9th sternum with lingular area infolded and prolonged posterolaterally to form lateral arm (lingular arm); paramere (superior lobe) fused with or articulating with 9th sternum, with posterodorsal and ventral prongs; ejaculatory apodeme short, rod shaped; aedeagal apodeme with posteroventral flange; aedeagus unsegmented, with a dorsal bifid ejaculatory hood and a medial ejaculatory process, and usually with ventrolateral processes.

Variation.—While all *Callicera* species are very similar in habitus, the male genitalia of *erratica* are quite distinct from those of other species studied (*aenea*, *duncani*, *montensis*, and *poultoni*). The lack of distinct

ventral lobes on the surstyle, the fusion of the lingular arm to the paramere, the enlargement and dorsal displacement of the ejaculatory process, along with the loss of the ventrolateral processes of the aedeagus are unique character states of *erratica*.

Comments.—*Callicera* belongs to the subfamily Eristalinae and is the type-genus of the tribe Callicerini. The sister-group of *Callicera* is *Notiocheilosia* Thompson, the other genus of Callicerini. *Callicera* is separated from all the other syrphid flies by the following combination of characters: 1) Antenna with terminal arista instead of subbasal arista; 2) basal anterior crossvein before middle of discal cell; and 3) pilose face and eye. The relationships of *Callicera* and its tribe are discussed by Thompson (1972: 86–91, 112–113).

Phylogeny.—The hypothesized relationships of the New World species of *Callicera* are as follows: *duncani* and *poultoni* are sister species and form the sister group to *montensis*; the resulting group is the sister group to *aenea* (type-species, Old World); and all of these species form the sister group to *erratica* ( $Callicera = e + (a + (m + (d + p)))$ ). This hypothesis is based principally on four morphoclines and is the only hypothesis that is compatible with the linear arrangement of all the morphoclines. The morphoclines are: 1) The development of the lingular arms from very short (*aenea*), to elongate and progressively more recurved (*duncani*, *poultoni* and *montensis*), to fused with parameres (*erratica*); 2) the development of the ventral lobe of the surstyle from undifferentiated and without a distinct excavation (*erratica*) to differentiated with a distinct excavation but with lobe broad (*aenea*), to on one hand a triangular ventral lobe (*montensis*) and on the other hand a narrow (*duncani*) and also to more curved (*poultoni*) ventral lobe ( $e \rightarrow ((a \rightarrow m) + (a \rightarrow d \rightarrow p))$ ); 3) the development of the antennal arista from short, thick and black (*erratica*), to extensively white (*aenea*), to progressively elongate (*montensis* (long), *duncani* (longer) and *poultoni* (longest)); and 4) the development of the frontal prominence from not developed (*erratica* and *aenea*), through slightly swollen (*duncani*) to strongly swollen (*poultoni*) and with lateral bulbous prominences (*montensis*). Other characters are discussed elsewhere (see under variation above and under *duncani* below).

#### KEY TO THE NORTH AMERICAN SPECIES OF *CALLICERA* PANZER

1. Arista thick, short, much shorter than 2nd antennal segment (Fig. 10); body pile wholly pale, whitish yellow to brilliant gold; wing usually entirely microtrichose, rarely bare narrowly along anterior edge of anal cell (eastern North America, Nevada) ..... *erratica* (Walker)
- Arista thin, long, always longer than 2nd antennal segment; body

- pile partially black either dorsally or ventrally; wing more extensively bare, always with an elongate medial bare area in 2nd basal cell ..... 2
2. Legs black, with pile wholly black; mesonotal pile completely reddish orange; abdomen with 1st and 2nd terga dull black, 3rd and 4th terga shiny black, without metallic fasciae; face with black pile (Rocky Mountains, California) ..... *montensis* Snow
- Legs with tibiae orange to brownish red; femora with pale pile fringes; mesonotal pile partially black; abdominal terga dull black with shiny metallic medial and apical fasciae; face pale pilose ..... 3
3. Scutellum with yellowish-white pile; mesonotal pile extensively yellowish white with scattered black pile intermixed; 3rd antennal segment shorter, only about 3 times as long as broad (Fig. 7); squama dirty white (Arizona) ..... *duncani* Curran
- Scutellum with black pile except for yellow fringe; mesonotal pile black except for yellow pile margins; 3rd antennal segment greatly elongate, about 5 times as long as broad (Fig. 9); squama dark brown (Mexico, El Salvador) ..... *poultoni* Verrall

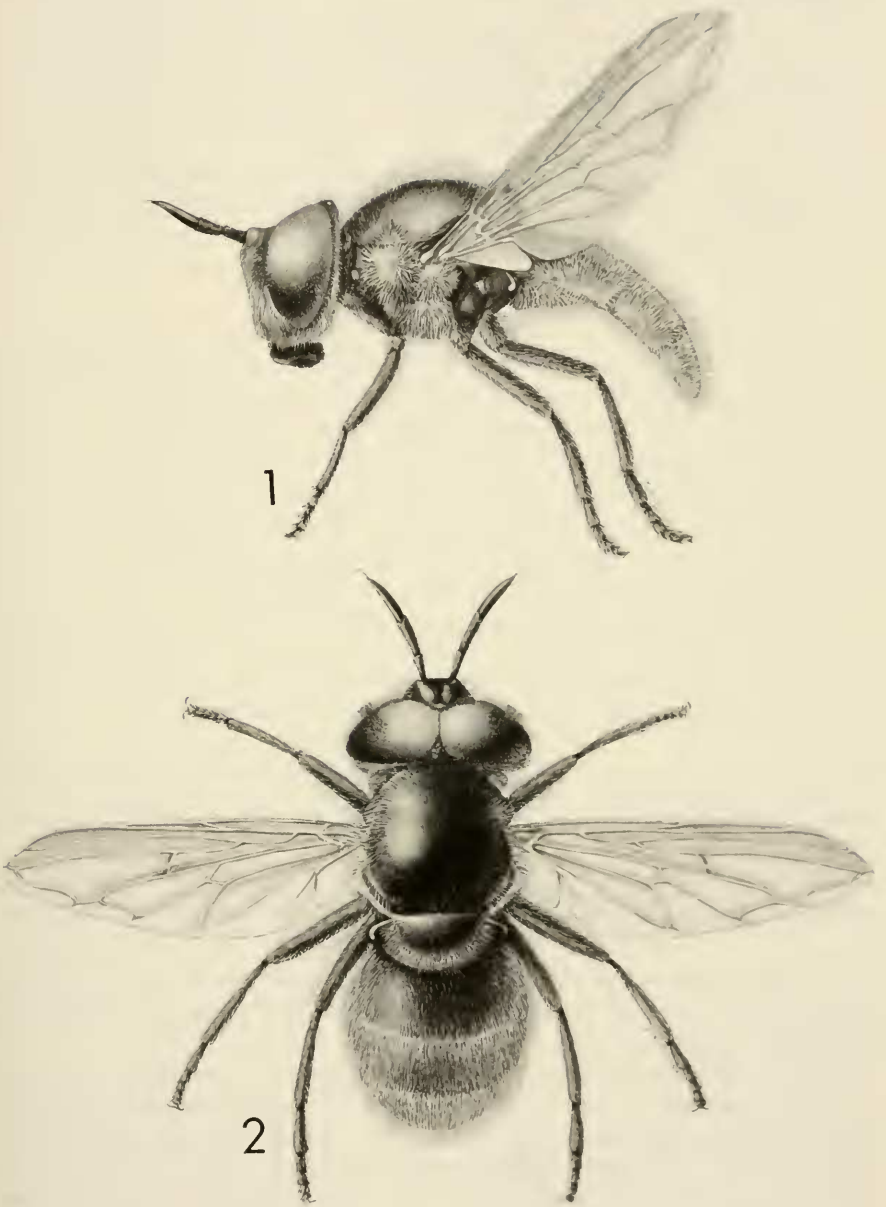
*Callicera duncani* Curran

Figs. 5, 7, 13, 19, 23

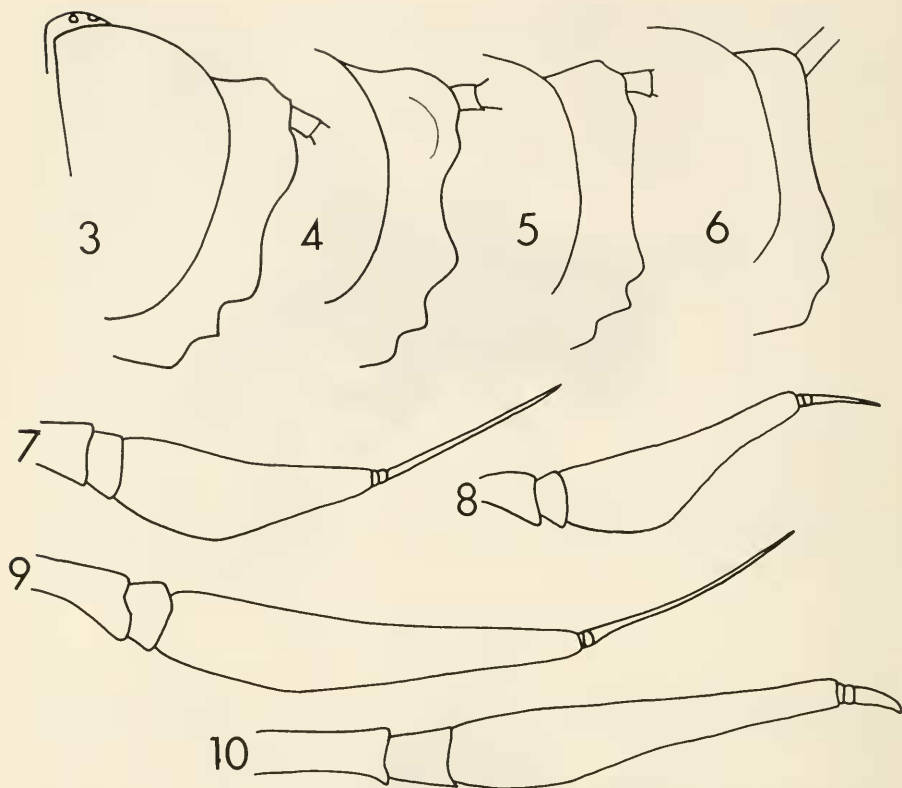
*Callicera duncani* Curran, 1935: 5 (Type-loc.: Globe, Arizona. Type-dep.: HT ♂ AMNH); Wirth et al., 1965: 595 (cat. cit., Arizona); Cole, 1969: 307 (cit., Arizona).

Description.—Over-all color black. *Head*: Face (Fig. 5) and cheek with yellowish-white pile; facial stripe with white pollen, frontal triangle shiny apicomediaally, with sparse white pollen laterally; vertical triangle with black pile, occiput with white pollen ventrally, with slightly more brownish pollen on dorsal  $\frac{1}{4}$ , with yellowish-white pile, with a few black cilia on dorsal  $\frac{1}{4}$ ; eye with brown and white pile in form of alternating vittae; antenna (Fig. 7) black except orange on basal  $\frac{1}{3}$  of 3rd segment, with black pile; arista long, white; antennal ratio 1.5:1:7.

*Thorax*: Mesonotum dull, with obscure submedial pollinose vittae, with extensive black and white pile and dense thick yellowish-white pile on anterior and lateral margins; pleura with dense yellowish-white pile dorsally, with a few black hairs intermixed, with pectus with black pile; scutellum dull, with sparse white pile medially, margined with dense yellowish-white pile, with long dense ventral pile fringe; squama brownish white, with brown fringe; plumula brown; halter brownish orange, with dark knob. *Wing*: Hyaline, with brownish costal tinge, microtrichose except bare basal  $\frac{1}{5}$  of 2nd basal cell and anterobasal  $\frac{1}{3}$  of anal cell; epaulet and basicosta with black pile. *Legs*: Coxae and trochanters black, with black pile except for yellow



Figs. 1-2. *Callicera aenea*, habitus. 1. Dorsal view. 2. Lateral view.



Figs. 3-6. Facial profiles. 3, *Callicera poultoni*. 4, *C. montensis*. 5, *C. duncani*. 6, *C. erratica*. Figs. 7-10. Antennae. 7, *C. duncani*. 8, *C. montensis* (syntype). 9, *C. poultoni*. 10, *C. erratica*.

pile laterally on hind coxa; femora black except orange apices, with black pile except for yellow pile fringe on posterior edge of front and middle femora and anterior edge of hind femur; tibiae orange, with white pile; front tarsus black, with black pile; middle and hind tarsi orange on basal  $\frac{2}{3}$  of basomere, black elsewhere, with black pile.

*Abdomen:* Black, with dull black pollen except shiny steel blue narrowly on sides, on apical margin of 2nd tergum except medially, on apical margins of 3rd and 4th terga and in form of narrow transverse and medially interrupted fasciae on 3rd and 4th terga; dorsum with white pile, with pile thicker and denser on lateral and apical margins of terga and apical  $\frac{2}{3}$  of 4th tergum; venter with black pile except with white pile laterally on 1st through 3rd sterna. Male genitalia (Figs. 13, 19, 23) with black pile.

*Distribution.*—U.S.A.: ARIZONA: Globe; Palmerlee; Huachuca Mts.,

Miller Canyon; Cochise County, Dragoon Mts., Cochise Stronghold (AMNH, MCZ, USNM, Weems).

Flight period.—Arizona (March to 3 May).

Comments.—*Callicera duncani* is the sister species of *poultoni*. These species have the same habitus: The head is black with pale pile; the thorax is dark with pale pile on margins of mesonotum, mesopleuron and scutellum; and the abdomen is dark with metallic fasciate maculae on 3rd and 4th terga, with extensive pale pile on 4th tergum and margins of the other terga. The pile of *duncani* is yellowish to hoary white and that of *poultoni* is golden.

*Callicera erratica* (Walker)

Figs. 6, 10, 12, 18, 24

*Chrysotoxum erraticum* Walker, 1849: 543 (Type-loc.: Unknown. Type-dep.: LT ♀ BMNH (here designated)); Kertész, 1910: 342 (cat. cit.).

*Callicera erratica*: Verrall, 1913: 329 (redescript. from type).

*Callicera johnsoni* Hunter, 1896: 87 (Type-loc.: near Strawberry Mansion in Fairmont Park, Philadelphia, Pennsylvania (see Johnson, 1914). Type-dep.: HT ♂ MCZ); Johnson, 1904: 160 (New Jersey); Aldrich, 1905: 347 (cat. cit., Pennsylvania); Kertész, 1910: 350 (cat. cit., Amer. sept.); Johnson, 1910: 764 (New Jersey); Metcalf, 1913: 80 (Pennsylvania, North Carolina); Johnson, 1914: 124 (restriction of type locality); Metcalf, 1916: 111 (North Carolina); Banks et al., 1916: 177 (Virginia); Cresson, 1919: 190 (Texas, descript. note); Johannsen, 1928: 793 (New York); Brimley, 1938: 355 (North Carolina); Wirth et al., 1965: 595 (cat. cit., Michigan, New York to North Carolina). NEW SYNONYM.

*Callicera johnsoni* var. *auripila* Metcalf, 1916: 112 (Type-loc.: Southport, North Carolina. Type-dep.: LT ♂ INHS (here designated)); Brimley, 1938: 355 (North Carolina). NEW SYNONYM.

*Callicera auripila*: Hull, 1947: 259 (Mississippi, elevated to species level); Hull, 1949: 344, fig. 19c (head); Wirth et al., 1965: 595 (cat. cit., North Carolina, Mississippi).

Description.—Over-all color brownish black to steel blue; pile from pale yellowish white to brilliant golden. *Head*: Face (Fig. 6) and cheek shiny; facial stripe with white pollen; frontal triangle with white pollen laterally, shiny apicomediaally; vertical triangle dull, with yellow pile; front with extensive whitish-gray pollen, with lateral brown pollinose maculae on dorsal ½; occiput with white pollen, with white pile ventrally becoming yellow dorsally; eye with extensive white pile with medial brown pilose vitta; antenna (Fig. 10) extensively black, slightly brownish red on basal ⅓ of 1st segment, with black pile; arista very short, thick black; antennal ratio 2.1:1:6.1.

*Thorax*: Mesonotum shiny laterally, with dull bluish-gray pollen medi-

ally, with submedial and medial black pollinose vittae; pleura shiny; scutellum with dense long white ventral pile fringe; squama and plumula yellowish white; halter pale yellow with black tip. *Wing*: Hyaline or with slight orange tinge; usually entirely microtrichose, rarely bare narrowly along anterior edge of anal cell; epaulet and basicosta with black pile. *Legs*: with golden pile, rarely with a few posterior apicolateral black hairs on femora; coxae and trochanters pollinose, dark; femora ranging from brown on basal  $\frac{3}{4}$  and orange apically to entirely orange; tibiae and tarsi ranging from orange on basal  $\frac{1}{3}$  and brown apically to entirely orange.

*Abdomen*: Dorsum extensively shiny, males rarely with dull pollinose transverse fasciae on 2nd and 3rd terga; venter sparsely pollinose. Male genitalia (Figs. 12, 18, 24) with golden pile.

*Variation*.—Over-all color is usually steel blue, but rarely is brownish black; pile color ranges from almost pure white through pale yellow to brilliant golden; leg color ranges from partially dark to entirely pale; abdominal terga are usually entirely shiny but rarely with brown pollinose fasciae on 2nd (broadly) and 3rd terga (narrowly). This variation is probably temperature induced (Dušek and Láška, 1974). The brilliant golden pilose specimens with entirely orange legs are southern, the pale pilose specimens with darker legs are northern and the darkest specimens are the early spring records from among the northern records.

*Distribution*.—USA: ALABAMA: Auburn (INHS). DISTRICT OF COLUMBIA: Washington (USNM). MARYLAND: Beltsville; Gaitherburg (USNM). MASSACHUSETTS: Amherst (USNM). MICHIGAN: East Lansing, Agricultural College (CNC). MISSISSIPPI: Oxford (CNC, UWM). MISSOURI: Columbia (UCB). NEVADA: Mt. Vernon County (Weems). NEW JERSEY: Glassboro; Manumuskin (USNM, BPIH). NEW YORK: Long Beach. NORTH CAROLINA: Southport; Onslow County, Jacksonville; Swannanoa; Southern Pines; Raleigh (CNC, INHS, MCZ, OhSU, UMSP, USNM, USU, Weems, UZMC). OHIO: Columbus (OhSU). PENNSYLVANIA: Philadelphia (MCZ, USNM). TEXAS: Round Mt. (Weems). VIRGINIA: Fluvanna County (USNM).

Canada: ONTARIO: Frontenac County (CNC). QUEBEC: Gatineau County, King Mountain (CNC).

*Flight period*.—An early spring species, flying from 26 February (Alabama) to 19 June (Ontario), with most records in April (11 records).

*Types*.—*Callicera erratica* Walker was described from an unspecified number of specimens. In the British Museum (Natural History), there is a single female labeled as type. I reject the assumption of holotype status for single remaining original specimens (see Crosskey, 1974: 272 (pro) and Vane-Wright, 1975: 26–28 (con) for discussion of this point). Therefore I have designated this single female as LECTOTYPE and have so labeled it.



*Callicera auripila* Metcalf was described from a series of “. . . about forty specimens . . . (cotypes) . . .” Some specimens of his original series are deposited in the Illinois Natural History Survey (Metcalf Collection), but other specimens are in the Museum of Comparative Zoology (Johnson Collection), Canadian National Collection (Hull Collection), University of Minnesota Collection, University of Wisconsin (Fluke Collection), Weems Collection, and Universitetets Zoologiske Museet Copenhagen (Lundbeck Collection). Most of this material has paratype labels, the Johnson Collection material has cotype labels and a male and female in the Illinois Natural History Survey each have a “Type” label. The source of this labeling is not known, but it was probably not done by Metcalf. Nevertheless, I follow the intent of the labeling by designating as LECTOTYPE the male specimen labeled “Type.” I have so labeled it. All other specimens are paralectotypes but have not been labeled as such.

Comments.—The pile color is variable in *erratica*. This has led to the extreme color forms being named as distinct taxa (*auripila* and *johnsoni*), but, as this variation has been found to be continuous and probably environmental, I have synonymized these names.

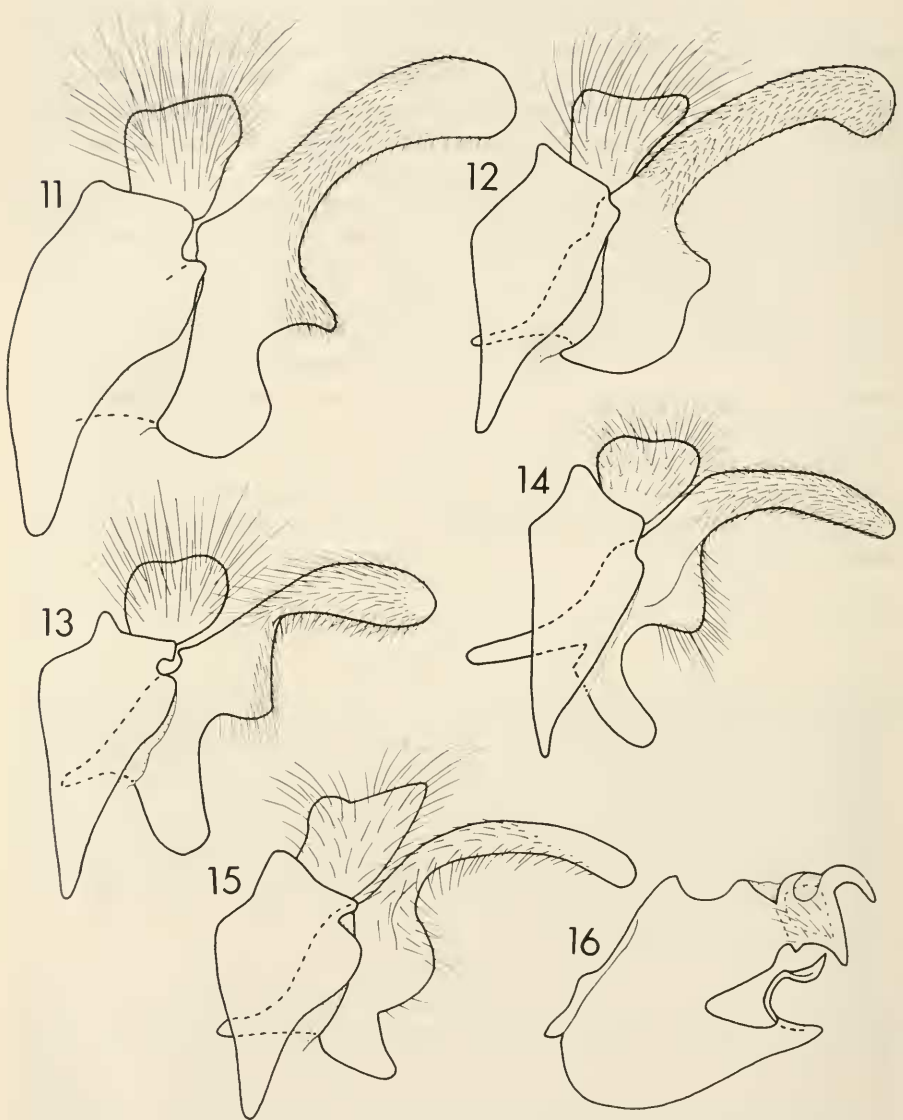
*Callicera montensis* Snow

Figs. 4, 8, 15, 16, 25

*Callicera montensis* Snow, 1892: 34, pl. 7, fig. 4 (habitus) (Type-loc.: Mt. Deception, 9000 ft., Manitou Park, Colorado (see Snow, 1895: 225). Type-dep.: LT ♀ Snow Mus., UKaL (here designated)); Snow, 1895: 225 (restriction of type-locality; New Mexico); Aldrich, 1905: 347 (cat. cit., Colorado, New Mexico); Kertész, 1910: 350 (cat. cit., Amer. sept.); Cresson, 1919: 190 (Arizona; descript. notes); Jones, 1922: 44 (Colorado); Wirth et al., 1965: 595 (cat. cit., Colorado, New Mexico); Cole, 1969: 307 (cit., Colorado, New Mexico).

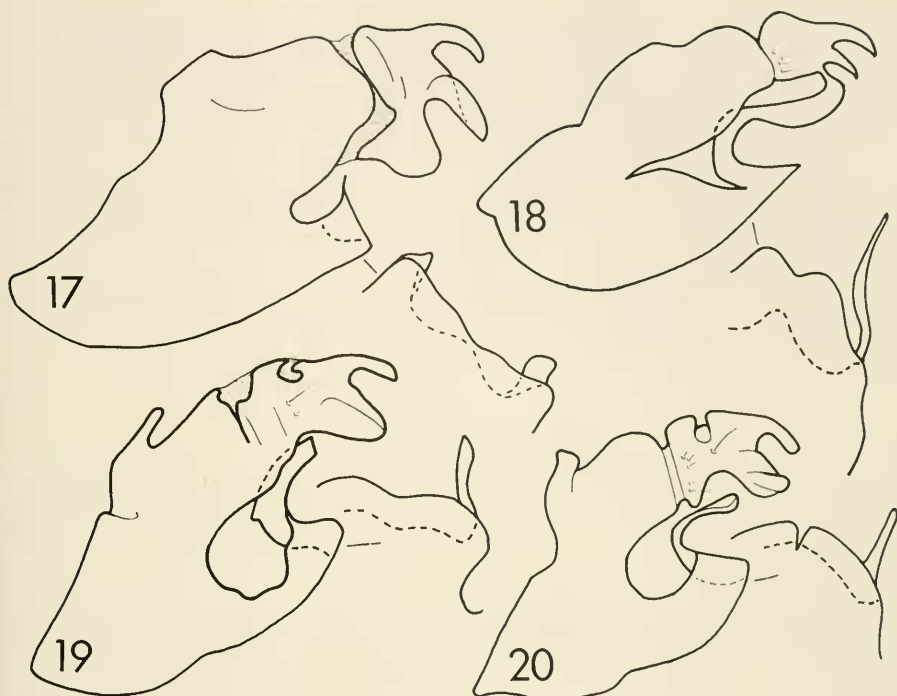
Description.—Over-all color black. *Head*: Almost entirely shiny, only narrowly with grayish-white pollen along facial stripe and on apex of frontal triangle; face (Fig. 4) (in males), cheek and vertical triangle with black pile; face (in females) with white pile; front with indistinct medial sulcus, with orange pile; occiput with white pile ventrally becoming yellow dorsally; eye with brown pile, without any distinct vittae; antenna (Fig. 8) black except reddish orange on basal  $\frac{1}{3}$  of 3rd segment, with black pile; arista long, white; antennal ratio 1.8:1:7.8.

*Thorax*: Shiny; mesonotum and scutellum with reddish-orange pile; pleura with black pile except with reddish-orange pile on dorsal  $\frac{1}{2}$  of mesopleuron; scutellum with a sparse short ventral pile fringe; squama dirty white with orange fringe; plumula black; halter brownish orange with black



Figs. 11-15. Male 9th tergum and associated structures, lateral views. 11, *Callicera aenea*. 12, *C. erratica*. 13, *C. duncani*. 14, *C. poultoni*. 15, *C. montensis* (syntype). Fig. 16. Male 9th sternum and associated structures of *C. montensis* (syntype), lateral view.

tip. *Wing*: Hyaline, microtrichose except bare as follows: basal  $\frac{1}{4}$  of submarginal cell, along anterior and posterior margins of apical cell on basal  $\frac{1}{3}$ , both basal cells, basal  $\frac{1}{4}$  and along anterior and posterior margins of discal cell on basal  $\frac{1}{2}$ , along anterior and posterior margins of cubital cell



Figs. 17-20. Male 9th sternum and associated structures, lateral views, with insert of ventral views of lingula area. 17, *Callicera aenea*. 18, *C. erratica*. 19, *C. duncani*. 20, *C. poultoni*.

on basal  $\frac{3}{4}$ , all of anal cell except for apicomedial microtrichose patch on apical  $\frac{1}{3}$ , and in front of vein Ax; epaulet and basicosta black pilose. *Legs*: Black, with black pile.

*Abdomen*: Shiny except with dull black pollen on 1st and 2nd terga and gray pollen on 1st sternum; dorsum with reddish-orange pile; venter with black pile. Male genitalia (Figs. 15, 16, 25) with black pile.

*Distribution*.—U.S.A.: ARIZONA: Grand Canyon (Weems). CALIFORNIA: San Bernardino County, Ambay (USNM). COLORADO: Manitou Park, Mt. Deception (UKaL). NEW MEXICO: Magdalena (UKaL). UTAH: Zion National Park (UW).

*Flight period*.—Arizona (23 May), California (8 April), Colorado (July), New Mexico (July), Utah (10 Sept.).

*Types*.—*Callicera montensis* was described from "3" males (Snow, 1892: 34) or from "numerous specimens" (Snow, 1892: 33). Later Snow (1895) repeated the number "3" and gave the date as "August." Byers et al. (1962) listed 4 male syntypes in the Snow Museum. One of these "syntypic"

males is from New Mexico (Byers, personal communication) and is not a type. The remaining three are labeled "Manitou Park, Colorado, F. H. Snow/July." I studied two of these, one of which I labeled as LECTOTYPE. The others are labeled as paralectotypes. The male genitalia (Figs. 15, 16, 25) were drawn from a paralectotype.

Comments.—Cresson (1919) mentioned a male specimen then in the collection of Academy of Natural Sciences of Philadelphia, that he believed differed significantly from Snow's original description and probably represented a new species. I have examined this specimen, now in the personal collection of H. V. Weems, Jr., and find it is the same as *montensis* Snow. The apparent discrepancies noted by Cresson were due to omissions in Snow's descriptions.

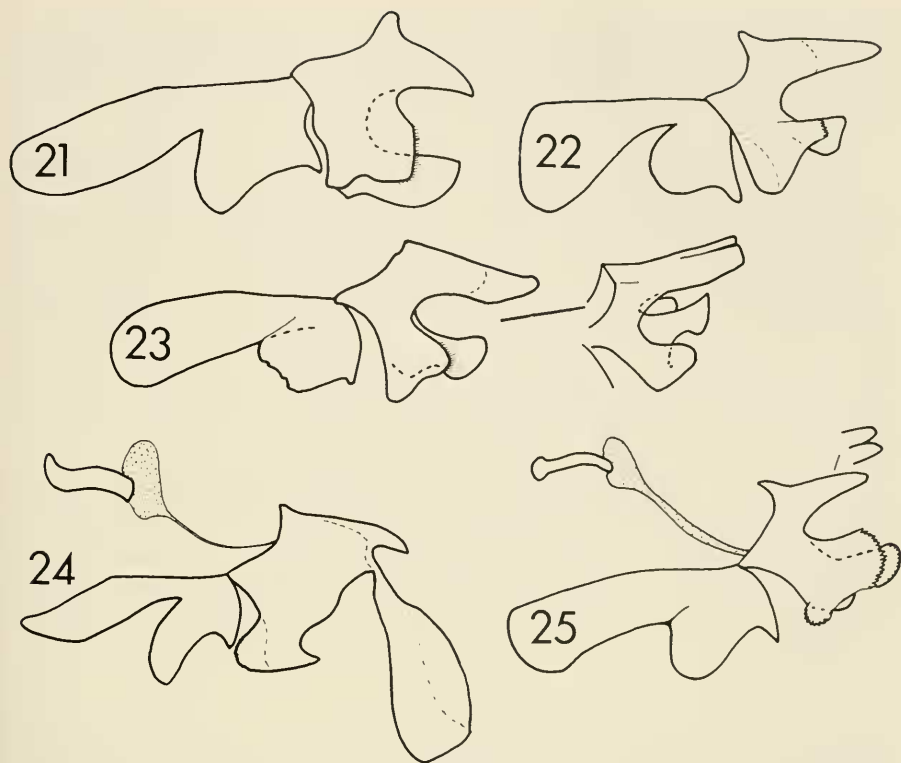
*Callicera poultoni* Verrall

Figs. 3, 9, 14, 20, 22

*Callicera poultoni* Verrall, 1913: 332 (Type-loc.: Mexico. Type-dep.: HT ♀ UMO); Fluke, 1957: 57 (cat. cit., Mexico); Thompson et al., 1976: 88 (cat. cit., Mexico).

Description.—Over-all color black. *Head*: Face (Fig. 3) subshiny, with yellow pile; cheek with sparse pollen and yellow pile; frontal triangle with sparse white pollen laterally, shiny apicomediaally; vertical triangle with black pile; occiput with white pollen and yellow pile ventrally becoming brownish pollinose and black pilose on dorsal  $\frac{1}{5}$ ; eye with brown pile except with white pile ventroposteriorly; antenna (Fig. 9) entirely black or slightly reddish basoventrally on 3rd segment and black elsewhere, with black pile; arista black on base, white elsewhere, long, thin; antennal ratio 3.1:1:12.9.

*Thorax*: Mesonotum with dull grayish-black pollen, with dark black medial and submedial pollinose vittae, with short thin black pile, with thick longer yellow pile forming almost continuous fascia around margins, with this fascia interrupted medially on anterior margin and behind humerus; pleura with dull pollen, with black pile except for yellow pile on dorsal  $\frac{1}{3}$  of sternopleuron, pteropleuron, and anterior edge and posterior dorsal apex of posterior mesopleuron; scutellum with dull pollen, with black pile, except for yellow dense apicoventral fringe; squama and plumula brownish black except squama with fringe more reddish brown; halter dark reddish orange with black head. *Wing*: Light brownish yellow, almost completely microtrichose, bare only narrowly basomedially in 2nd basal cell and anterobasally in anal cell; epaulet and basicosta with black pile. *Legs*: Coxae and trochanters with dull pollen, black, with black pile except for yellow pile laterally on hind coxa; femora black on basal  $\frac{3}{4}$ , orange apically, with black pile except for yellow fringe posteriorly on front and middle femora and anteriorly on hind femur; tibiae orange except slightly more brownish on



Figs. 21–25. Aedeagi, lateral views. 21, *Callicera aenea*. 22, *C. poultoni*. 23, *C. duncani* (including a dorso-oblique view). 24, *C. erratica*. 25, *C. montensis* (syntype).

apical  $\frac{1}{3}$  of front tibia, with black pile anteriorly and yellow pile posteriorly except for more reddish-brown pile anteriorly on hind tibia; front tarsus black except orange basal  $\frac{3}{4}$  of basomere, with black pile; middle and hind tarsi orange on basal 3 tarsomeres, black on apical tarsomeres, mainly with black pile with some yellow pile on basomeres.

**Abdomen:** Black, with dull black pollen except shiny golden narrowly on sides, on apical margin of 2nd tergum except medially, on apical margins of 3rd and 4th terga and in form of narrow transverse and medially interrupted fasciae on 3rd and 4th terga; dorsum with golden pile, with pile thicker and denser on lateral and apical margins of terga and apical  $\frac{2}{3}$  of 4th tergum; venter with extensive black pile, only with white pile on lateral  $\frac{1}{4}$  of 1st and narrowly on sides of 2nd sternum. Male genitalia (Figs. 14, 20, 22) with black pile.

**Distribution.**—MEXICO: OAXACA: Just west of Chiapas Border, 19 km

west of Rizo de Oro Ridge, south Cerro Baul, 1615 meters. CHIAPAS: Cerro Huitepec, west of San Cristobal de las Casas, 2591 meters (CAS, USNM). EL SALVADOR: Bosque Monte Cristo, 2418 meters (Mus. Nac. El Salvador).

Flight period.—Mexico (28 April to 23 May), El Salvador (3 February).

Comments.—*Callicera poultoni* was described from a single rubbed and discolored female. The above redescription is based on three males in excellent condition. There are a few discrepancies between these males and Verrall's original description: 1) Verrall's description of the antennal color is confusing. He stated ". . . basal joint black then orange . . ." and nothing more. The antennae of my specimens are entirely black except for reddish basoventral third at third segment and the white arista. 2) Verrall wrote "legs, after black coxae and trochanters, all fulvous . . ." whereas my specimens have the basal half or more of the femora black. 3) Verrall described the "Belly with rather universal golden pubescence . . ." whereas my specimens are almost completely black pilose. There are a few other differences between my specimens and Verrall's description, but these are undoubtedly due to the condition and sex of the specimen on which Verrall's description was based. Despite the above discrepancies, my specimens agree so well with Verrall's description that I have no doubt that they are assignable to the same species.

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#### LITERATURE CITED

- Aldrich, J. M. 1905. A catalogue of North American Diptera. *Smithson. Misc. Collect.* 46(2): 1-680.
- Banks, N., C. T. Greene, W. L. McAtee, and R. C. Shannon. 1916. District of Columbia Diptera: Syrphidae. *Proc. Biol. Soc. Wash.* 29: 173-203.
- Brimley, C. S. 1938. The Insects of North Carolina, being a list of the Insects of North Carolina and their close relatives. North Carolina Dept. Agric., Div. Entomol., Raleigh. 560 pp.
- Byers, G. W., F. Blank, W. J. Hanson, D. F. Beneway, and R. W. Fredrickson. 1962. Catalogue of the types in the Snow Entomological Museum. Part III (Diptera). *Univ. Kans. Sci. Bull.* 43: 131-181.
- Coe, R. L. 1938. Rediscovery of *Callicera yerburyi* Verrall (Diptera: Syrphidae): its breeding habits, with a description of the larva. *Entomologist.* 71: 97-102.
- . 1939. *Callicera yerburyi* Verrall (Diptera: Syrphidae) a synonym of *C. rufa* Schummel: further details of its life-history, with a description of the puparium. *Entomologist.* 72: 228-231.
- . 1941. *Callicera rufa* Schummel (Diptera: Syrphidae): colour-variation of abdominal hairs in the adult, with a note on longevity of the larva. *Entomologist.* 74: 131-132.

- . 1964. Diptera from Nepal. Syrphidae. Bull. Br. Mus. (Nat. Hist.) Entomol. 15: 255–290.
- Cole, F. R. 1969. The flies of Western North America. xii + 693 pp., 1 pl., 360 figs. Univ. Calif. Press, Berkeley and Los Angeles.
- Cresson, E. T., Jr. 1919. Dipterological notes and descriptions. Proc. Acad. Nat. Sci. Philad. 71: 171–194.
- Crosskey, R. W. 1974. The British Tachinidae of Walker and Stephens (Diptera). Bull. Br. Mus. (Nat. Hist.) Entomol. 30: 267–308.
- Curran, C. H. 1935. New American Diptera. Am. Mus. Novit. 812, 24 pp.
- Dušek, J. and P. Láška. 1974. Influence of temperature during pupal development on the color of syrphid adults (Syrphidae, Diptera). Folia Prirod. Fak. Univ. Purkyne, Brno 15 (Biol. 43): 77–81.
- Fluke, C. L. 1956–57. Catalogue of the family Syrphidae in the Neotropical Region. Rev. Bras. Entomol. 6: 193–268 (1956); 7: 1–181 (1957).
- Hull, F. M. 1947. The syrphid flies of Mississippi. J. Miss. Acad. Sci. 2: 255–262.
- . 1949. The morphology and inter-relationship of the genera of syrphid flies, recent and fossil. Trans. Zool. Soc. Lond. 26: 257–408.
- Hunter, W. D. 1896. A contribution to the knowledge of North American Syrphidae. Can. Entomol. 28: 87–101.
- Imperial Bureau of Entomology. 1928. Insecta. Zool. Record. 64(11) 418 pp.
- Johannsen, O. A. 1928. Order of Diptera, pp. 687–869. In Leonard, M. D., List of the insects of New York with a list of the spiders and certain other allied groups. Mem. N.Y. (Cornell) Agric. Exp. Stn. 101, 1121 pp. (1926).
- Johnson, C. W. 1904. A supplementary list of the Diptera of New Jersey. Entomol. News. 16: 157–163.
- . 1910. Order Diptera, pp. 703–814, figs. 293–340. In Smith, J. B., The Insects of New Jersey. Rep. New Jersey State Mus. 1901: 15–888, 340 figs.
- . 1914. Notes on inadequate locality labels (Dipt.). Entomol. News. 25: 123–126.
- Jones, C. R. 1922. A contribution to our knowledge of the Syrphidae of Colorado. Bull. Agric. Exp. Stn. Colo. Agric. Coll. 269, 72 pp., 8 pls.
- Kertész, K. 1910. Catalogus dipterorum hucusque descriptorum. Vol. 7, 470 pp. Lipsiae, Budapestini (Leipzig, Budapest).
- Knutson, L. V., F. C. Thompson, and J. R. Vockeroth. 1975. Family Syrphidae, pp. 307–374. In Delfinado, M. D. and D. E. Hardy, eds., A Catalog of the Diptera of the Oriental Region, Vol. 2, x + 459 pp., Univ. Hawaii Press, Honolulu.
- Leonard, M. D. 1928. List of the insects of New York with a list of the spiders and certain other allied groups. Mem. New York (Cornell) Agric. Exp. Stn. 101: 1–1121 (1926).
- Metcalf, C. L. 1913. The Syrphidae of Ohio. Bull. Ohio Biol. Survey. 1: 7–122, 11 pls., 3 figs. (=Bull. Ohio State Univ. 17(31)).
- . 1916. A list of Syrphidae of North Carolina. J. Elisha Mitchell Sci. Soc. 32: 95–112.
- Snow, W. A. 1892. Notes and descriptions of Syrphidae. Kansas Univ. Quart. 1: 33–38, pl. 7.
- . 1895. Diptera of Colorado and New Mexico. Syrphidae. Kans. Univ. Quart. 3: 225–247.
- Panzer, G. F. W. 1809. Faunae insectorum germanicae initiae oder Deutschlands Insecten. H. 104, 24 pp., 24 pls. Nurnberg.
- Portevin, G. 1927. Description d'une nouvelle espèce de *Callicera* (Syrphidae). Encycl. Entomol. (3)2, Dipt. 4: 15.
- Thompson, F. C. 1972. A contribution to a generic revision of the Neotropical Milesinae (Diptera: Syrphidae). Arq. Zool. (Sao Paulo) 23: 73–215.
- , J. R. Vockeroth, and Y. S. Sedman. 1976. Family Syrphidae. Catalog. Dipt. Amer. S. United States 46, 195 pp.



- Vane-Wright, R. I. 1975. The butterflies named by J. F. Gmelin (Lepidoptera: Rhopalocera). *Bull. Br. Mus. (Nat. Hist.) Entomol.* 32: 17-64, 6 pls.
- Verrall, G. H. 1913. Descriptions of new species of the syrphid genus *Callicera* (Diptera). *Trans. Entomol. Soc. Lond.* 1913: 323-333.
- Walker, F. 1849. List of the specimens of dipterous insects in the collections of the British Museum. Vol. 3, pp. 485-687. London.
- Wirth, W. W., Y. S. Sedman, and H. V. Weems, Jr. 1965. Family Syrphidae, pp. 557-625. *In* Stone, A., C. W. Sabrosky, W. W. Wirth, R. H. Foote, and J. Coulson (eds.), *A catalog of the Diptera of America north of Mexico*. U.S. Dep. Agric., Agric. Handb. 276, 1696 pp.